HHS Public Access

Author manuscript

J Acquir Immune Defic Syndr. Author manuscript; available in PMC 2018 September 01.

Published in final edited form as:

J Acquir Immune Defic Syndr. 2017 September 01; 76(1): e1–e6. doi:10.1097/QAI.0000000000001427.

Trends in ART prescription and viral suppression among HIV-positive young adults in care in the United States, 2009–2013

Linda Beer, PhD[a], **Christine L. Mattson, PhD**[a], **Heather Bradley, PhD**[a], **R. Luke Shouse, MD**[a], and **for the Medical Monitoring Project**

[a]Division of HIV/AIDS Prevention, Centers for Disease Control and Prevention, Atlanta, GA, USA

Abstract

Background—Only 13% of HIV-positive young adults are estimated to be virally suppressed and, even among those receiving medical care, HIV-positive young adults are less likely than older adults to take antiretroviral therapy (ART), be adherent, and be virally suppressed. We sought to examine trends in treatment and health outcomes from 2009 to 2013 among HIV-positive young adults (ages 18–24) in care.

Setting—The Medical Monitoring Project (MMP) is a complex sample survey of HIV-infected adults receiving medical care in the United States.

Methods—We used weighted interview and medical record data collected 06/2009-05/2014 to estimate trends in the prevalence of ART prescription, adherence, side effects, single-tablet ART regimens, regular care utilization and viral suppression among young adults.

Results—From 2009 to 2013, there were significant increases in ART prescription (76% to 87%) and the proportion of young adults taking ART who reported taking single-tablet regimens (49% to 62%). There was no significant change in adherence, side effects, or regular care utilization. Although viral suppression at last test did not change (65% at both time periods), the proportion of young adults who were sustainably virally suppressed significantly increased (29% to 46%). Accounting for ART prescription and single-tablet regimens use attenuated the sustained viral suppression trend.

Conclusions—Although the level of viral suppression among young adults in care remains suboptimal, the observed increases in ART prescription and sustained viral suppression may be cause for optimism regarding efforts to improve outcomes for this vulnerable population.

Keywords

HIV; Youth; Young MSM; Antiretroviral therapy; Viral load

Corresponding author/requests for reprints should be directed to: Linda Beer, PhD, Division of HIV/AIDS Prevention, Centers for Disease Control and Prevention, 1600 Clifton Rd. NE, MS-E46, Atlanta, GA 30329, Office: 404.639.5268, Fax: 404.639.8640, LBeer@cdc.gov.

Conflicts of interest: The authors declare no conflicts of interest.

Portions of this work were presented at the 11th International Conference on HIV Treatment and Prevention Adherence in Hollywood, FL, USA in May 2016.

Disclaimer: The findings and conclusions in this report are those of the authors and do not necessarily represent the views of the Centers for Disease Control and Prevention.

Introduction

HIV viral suppression is key to reducing the risk of HIV transmission, morbidity, and mortality (1, 2) and thus it is crucial for prevention and care efforts. Only 13% of HIV-positive young adults are estimated to be virally suppressed (3) and, even among those receiving medical care, HIV-positive young adults are less likely than older adults to take antiretroviral therapy (ART), be adherent, and be virally suppressed (4–6). Agwu and colleagues found evidence of increasing ART use and decreasing viremia from 2002 to 2010 among a cohort of youth living with HIV who were perinatally-infected (7). Recent developments in HIV care and treatment may have improved levels of viral suppression more broadly among young adults. Clinical guidelines now recommend the universal prescription of ART and simpler, more tolerable ART regimens that may be more forgiving of non-adherence have been developed (8–10). There has also been enhanced focus across medical, public health, and community groups on improving the HIV care continuum among youth (11–13). However, the effect of these developments among HIV-positive youth nationally is unknown.

This analysis was guided by the following questions: have recent developments in HIV care and treatment been accompanied by increased ART prescription, adherence, and care utilization among young adults in care? If so, have these changes contributed to improvements in viral suppression? To answer these questions, we estimated temporal trends in these factors among HIV-positive young adults in care in the United States from 2009 to 2013.

Methods

Medical Monitoring Project (MMP)

We analyzed pooled data from the 2009–2013 cycles of the Medical Monitoring Project (MMP), an HIV surveillance system designed to produce annual nationally representative cross-sectional estimates of behavioral and clinical characteristics of HIV-infected adults receiving medical care in the United States and Puerto Rico. MMP methods, including sampling, weighting procedures, and response rates, have been described in detail elsewhere (14). During these years, MMP used a three-stage, probability-proportional-to-size sampling method. First, U.S. states and one territory were sampled, then facilities providing outpatient HIV care in those areas, and finally, eligible HIV-infected patients. All sampled states and territories participated in every cycle. The facility response rate ranged from 76–85% and the patient response rate ranged from 49–55%. Eligible persons were HIV-infected, were aged 18 years or older, and received medical care in participating facilities between January and April in the cycle year for which they were sampled. Interview and medical record abstraction data were collected June 2009 through May 2014. Data were weighted on the basis of known probabilities of selection at state or territory, facility, and patient levels (15). In addition, predictors of nonresponse were determined from analysis of data from sampled facilities and patients, and data were then weighted to adjust for non-response, after established methods (16, 17). Predictors of nonresponse varied by cycle year and project area, but in general facility size, private practice, male gender, younger age, race/ethnicity,

and shorter time since HIV diagnosis were associated with nonresponse and informed the weighting classes for the data.

In accordance with the federal human subjects protection regulations (18) and guidelines for defining public health research (19), MMP was determined to be a non-research, public health surveillance activity used for disease control program or policy purposes. Participating states or territories and facilities obtained local institutional review board approval to conduct MMP if required locally. Informed consent was obtained from all interviewed participants.

Analytic methods

In this analysis we included 636 young adults aged 18–24 who were receiving HIV care in the United States. The sample sizes and proportions of the total MMP sample of all persons receiving HIV care by year were 2009, n=107 (16%); 2010, n=125 (21%); 2011, n=127 (21%); 2012, n=144 (22%); and 2013, n=133 (21%). We estimated weighted percentages by year and used bivariate linear regression (ordinary least squares) to estimate trends from 2009 to 2013 in 1) ART prescription during the past 12 months, 2) regular care utilization (at least 1 viral load in each 6 month period during the past 12 months), 3) 100% adherence to ART doses during the past 3 days, 4) being bothered by ART side effects in the past 30 days, 5) taking a once-daily single tablet ART regimen, 6) viral suppression (<200 copies/mL at last test), and 7) sustained viral suppression (<200 copies/mL at all tests during past 12 months). All measures were derived from medical record reviews except the adherence, side effects, and single-tablet regimen measures, which were self-reported. Beta-coefficients for year represent the average percentage point change from one year to the next. We considered trends to be statistically significant when $P<0.05$. For the viral suppression measures that showed a significant trend, we used multivariate linear regression to assess how much change in viral suppression was mediated by change over time in covariates that also significantly increased over the time period. We also estimated trends in selected sociodemographic characteristics collected by interview (black non-Hispanic race versus other racial/ethnic groups, male gender versus female or transgender, homosexual or bisexual identity versus heterosexual, less than high school education versus higher, at or below household poverty guideline versus over, uninsured or only Ryan White HIV/AIDS Program coverage versus private or public insurance, 5 or more years since HIV diagnosis versus less than 5 years) and HIV disease stage derived from medical record review (AIDS or nadir CD4+ 0–199 versus no AIDS and nadir CD4+ 200+) to evaluate their roles as potential confounders of change over time in viral suppression. All data were weighted for unequal selection probabilities and non-response.

Results

The characteristics of HIV-positive young adults in care in the United States during 2009–2013 have been reported elsewhere (4), but overall among the pooled dataset (n=636) 43% (95% confidence interval [CI] 37–50) were black men. The majority had a gay or bisexual identity (62%, CI 57–67) and were living in households at or below the poverty level (62%, CI 56–66). Approximately 35% (CI 28–41) were uninsured or only had Ryan White HIV/

AIDS Program coverage. Over the 12 months before interview, 14% (CI 10–18) reported being homeless and 11% (CI 8–14) had been incarcerated. Most were diagnosed with HIV after the age of 10 years (88%, CI 84–91), and three-quarters had been diagnosed for less than 5 years (75%, CI 70–80). There were no significant changes in sociodemographic characteristics, time since HIV diagnosis, and HIV disease stage during 2009–2013 with the exception of an increasing proportion of men over the time period (65% in 2009 to 74% in 2013, β_{TREND}=0.03 P_{TREND}=0.03, Table 1).

ART prescription among young adults significantly increased from 76% in 2009 to 87% in 2013 (β_{TREND}=0.04 P_{TREND}=0.01; Table 2). Among those taking ART, however, ART adherence and reported problems with side effects did not significantly change over the period. The proportion of young adults taking ART who reported taking a single-tablet regimen significantly increased from 49% in 2009 to 62% in 2013 (β_{TREND}=0.04 P_{TREND}=0.04). There was no significant change in regular care utilization over the period.

Although viral suppression at last test did not change over the time period (65% in 2009 to 65% in 2013, β_{TREND}=0.02 P_{TREND}=0.22), the proportion of young adults who were sustainably virally suppressed significantly increased (29% in 2009 to 46% in 2013, β_{TREND}=0.05 P_{TREND}=<0.01. Figure 1 illustrates these findings. The proportion of young adults who were virally suppressed at their last test *and* had sustained viral suppression increased from 2009 to 2013, but there was no concomitant increase in those who were virally suppressed *only* at their last test. Instead, the proportion who were only virally suppressed at their last visit decreased over the time period. Adjusting for the increasing proportion of men among young adults over the time period did not change the sustained viral suppression trend (adjusted β_{TREND}=0.05 P_{TREND}=<0.01; data not shown in table). Accounting for ART prescription somewhat attenuated the sustained viral suppression trend (adjusted β_{TREND}=0.04, P_{TREND}=0.02), suggesting that some of the increase in sustained viral suppression was mediated by increased ART prescription. Adding to the model a variable measuring whether the person prescribed ART reported taking a single-tablet regimen further attenuated the sustained viral suppression trend (adjusted β_{TREND} =0.03, P_{TREND}=0.04).

Discussion

We found significant improvements in sustained viral suppression from 2009 to 2013 among young adults in care, which were partially attributable to increases in the proportions of young adults prescribed ART and taking single-tablet regimens. However, we found no significant trend in viral suppression at last test. In any given year, only approximately 2/3 of young adults in HIV care were virally suppressed at last test, well short of the National HIV/AIDS Strategy (NHAS) 80% viral suppression goal for all diagnosed persons (13). However, increasingly more young adults were able to maintain suppression, and a smaller proportion were only suppressed at their last test, which indicates some progress has been made in improving health among this disproportionately affected population.

Our data show that between 2009 and 2013 providers were more likely to prescribe ART to young adults in later years and also more likely to prescribe single-tablet regimens, both of

which were associated with increased levels of sustained viral suppression. During this time period, guidelines for initiating ART steadily moved away from using CD4 count as a criterion for initiation (8), and our data may reflect increasing provider adoption of these guidelines. Providers have often cited concerns about treatment readiness and other barriers to adherence as a reason to defer ART initiation for otherwise clinically-eligible young people (20, 21), who on average report lower adherence than older persons (4). However, providers may have grown less concerned about nonadherence as a reason to defer therapy among young adults because of the increasing evidence of the benefits of early ART and the availability of better regimen options that are more forgiving of nonadherence (9). The development of multiple single-tablet regimens during this time period, which are associated with better adherence, lower cost and increased patient satisfaction (10) also may have facilitated provider prescription of these regimens among young adults.

Despite improvements in sustained viral suppression, the prevalence of viral suppression at last test remained stable from 2009 to 2013. This stability may be due to lack of improvement in adherence among young adults. Although one might expect that the increase in use of single-tablet regimens would be accompanied by increased adherence, it is important to note that our measure of adherence is self-reported and limited to the past three days, which may overestimate adherence and limit our ability to detect differences among persons due to ceiling effects (22). It is also possible that the use of single-tablet regimens has a greater effect on non-persistence (treatment discontinuation) rather than non-adherence (treatment interruption over a specified time period); Sweet and colleagues found that non-persistence was higher among persons taking multi-tablet regimens compared to single-tablet regimens (23).

Despite the limitations of the adherence measure, the lack of improvements observed among young adults suggest that wider development and implementation of effective strategies to improve adherence among young persons may be warranted. A recent systematic review of adherence interventions for youth found that most interventions were small pilots that need to be replicated; their findings indicated that a phone-based counseling approach with adherence monitors and weekly individual and family counseling may be effective strategies for improving adherence in this population (24). Our findings on the contribution of single-tablet regimens to improvements in sustained viral suppression suggest that simplifying regimens might be an effective strategy to increase viral suppression among young adults. In addition, when selecting regimens providers may need to consider the relatively high prevalence of side effects reported by young adults, which did not decrease over the time period. The development of injectable long-acting antitretrovirals may also prove to be a promising strategy for increasing viral suppression among this population (25).

This analysis has limitations. First, our patient response rates ranged from 49–55%, although our use of population-based sampling methods and weighting adjustments for non-response should reduce bias (26), and the MMP population is demographically similar to all HIV-diagnosed persons in the United States (27). Another potential limitation to the generalizability of our estimates is our selection of patients based on receipt of HIV care in the first 4 months of the calendar year. However, Sullivan and colleagues found that 88% of HIV patients had a medical visit in the first 4 months of the year, though there were some

clinical differences in this group compared to those seen later in the year (28). We should note, however, that our findings regarding trends should not be affected by these limitations, as they were consistent throughout the time period. As noted earlier, our adherence measure is self-reported and only captures the past three days, which may overestimate adherence because of measurement error resulting from social desirability bias and limit our ability to assess changes in adherence due to ceiling effects (22). In addition, we did not assess other potential explanatory factors for changes in viral suppression, such as changes in ART regimens. Finally, we cannot assess temporality between the self-reported interview measures and viral suppression.

In conclusion, we saw significant improvements in sustained viral suppression among HIV-positive young adults in care in the United States, which seem to be partially attributable to increases in ART prescription and use of single tablet regimens. However, it is important to note that the level of viral suppression among young adults in care remains low; it falls short of the NHAS goals and is significantly lower than is found for older age groups (13). Nevertheless, the observed increases in ART prescription and sustained viral suppression among young adults in care are encouraging, and suggest there may be cause for optimism regarding efforts to improve outcomes for this vulnerable population.

Acknowledgments

The following are the contributions of the authors to the study: L.B.: study conception, data analysis, and wrote the article; C.L.M., H.B., and R.L.S.: study conception and edited the article. We thank participating MMP patients, facilities, project areas, and Provider and Community Advisory Board members. We also acknowledge the contributions of the Clinical Outcomes Team and Behavioral and Clinical Surveillance Branch at CDC and the MMP project areas (http://www.cdc.gov/hiv/statistics/systems/mmp/resources.html).

Sources of funding: Funding for the Medical Monitoring Project is provided by the Centers for Disease Control and Prevention.

References

1. Cohen MS, Chen YQ, McCauley M, Gamble T, Hosseinipour MC, Kumarasamy N, et al. Antiretroviral Therapy for the Prevention of HIV-1 Transmission. The New England journal of medicine. 2016
2. May MT, Gompels M, Delpech V, Porter K, Orkin C, Kegg S, et al. Impact on life expectancy of HIV-1 positive individuals of CD4+ cell count and viral load response to antiretroviral therapy. AIDS (London, England). 2014; 28(8):1193–202.
3. Bradley, H., Hall, HI., Wolitski, R., Handel, M., Stone, A., LaFlam, M., et al. Vital Signs: HIV Diagnosis, Care, and Treatment Among Persons Living with HIV — United States, 2011. 2014 Nov 28. 2014 Report No.: Contract No.: 47
4. Beer L, Mattson CL, Shouse RL, Prejean J. Receipt of clinical and prevention services, clinical outcomes, and sexual risk behaviors among HIV-infected young adults in care in the United States. AIDS care. 2016:1–5.
5. Zanoni BC, Mayer KH. The adolescent and young adult HIV cascade of care in the United States: exaggerated health disparities. AIDS patient care and STDs. 2014; 28(3):128–35. [PubMed: 24601734]
6. Kahana SY, Fernandez MI, Wilson PA, Bauermeister JA, Lee S, Wilson CM, et al. Rates and correlates of antiretroviral therapy use and virologic suppression among perinatally and behaviorally HIV-infected youth linked to care in the United States. Journal of acquired immune deficiency syndromes (1999). 2015; 68(2):169–77. [PubMed: 25590270]

7. Agwu AL, Fleishman JA, Rutstein R, Korthuis PT, Gebo K. Changes in Advanced Immunosuppression and Detectable HIV Viremia Among Perinatally HIV-Infected Youth in the Multisite United States HIV Research Network. Journal of the Pediatric Infectious Diseases Society. 2013; 2(3):215–23. [PubMed: 26619475]
8. Panel on Antiretroviral Guidelines for Adults and Adolescents. [Accessed July 20, 2016] Guidelines for the use of antiretroviral agents in HIV-1-infected adults and adolescents. 2016. [Available from: http://www.aidsinfo.nih.gov/ContentFiles/AdultandAdolescentGL.pdf
9. Shuter J. Forgiveness of non-adherence to HIV-1 antiretroviral therapy. The Journal of antimicrobial chemotherapy. 2008; 61(4):769–73. [PubMed: 18256112]
10. Truong WR, Schafer JJ, Short WR. Once-Daily, Single-Tablet Regimens For the Treatment of HIV-1 Infection. P & T : a peer-reviewed journal for formulary management. 2015; 40(1):44–55. [PubMed: 25628507]
11. Centers for Disease Control and Prevention. HIV Among Youth. 2015. [Available from: http://www.cdc.gov/hiv/group/age/youth/index.html
12. Koenig LJ, Hoyer D, Purcell DW, Zaza S, Mermin J. Young People and HIV: A Call to Action. American journal of public health. 2016:e1–e4.
13. White House Office of National AIDS Policy. National HIV/AIDS Strategy for the United States: Updated to 2020 Washington, DC: White House Office of National AIDS Policy. 2015. [Available from: https://www.aids.gov/federal-resources/national-hiv-aids-strategy/nhas-update.pdf
14. Bradley, H., Frazier, E., Huang, P., Fagan, J., Do, A., Mattson, C., et al. Behavioral and Clinical Characteristics of Persons Receiving Medical Care for HIV Infection Medical Monitoring Project United States, 2010. Atlanta, GA: 2014 Oct. 2014. Report No
15. Harding, L.Iachan, R.Johnson, C.Kyle, T., Skarbinski, J., editors. Weighting Methods for the 2010 Data Collection Cycle of the Medical Monitoring Project. Joint Statistical Meeting; 2013 August 3 – 8, 2013; Montréal, QC, H2Z 1H2, Canada. 2013.
16. Särndal, C-E., Lundström, S. Estimation in Surveys with Nonresponse. Chichester: John Wiley & Sons; 2005.
17. Heeringa, S., West, BT., Berglund, PA. Applied survey data analysis. Boca Raton, FL: Taylor & Francis; 2010.
18. [Accessed February 4, 2014] Protection of Human Subjects, US Federal Code Title 45 Part 46. 2009. [Available from: http://www.hhs.gov/ohrp/humansubjects/guidance/45cfr46.html
19. Centers for Disease Control and Prevention. [Accessed February 4, 2014] Distinguishing Public Health Research and Public Health Nonresearch. 2010. [Available from: http://www.cdc.gov/od/science/integrity/docs/cdc-policy-distinguishing-public-health-research-nonresearch.pdf
20. Gagliardo C, Murray M, Saiman L, Neu N. Initiation of antiretroviral therapy in youth with HIV: a U.S.-based provider survey. AIDS patient care and STDs. 2013; 27(9):498–502. [PubMed: 23937549]
21. Lee L, Rand CS, Ellen JM, Agwu AL. Factors informing HIV providers' decisions to start antiretroviral therapy for young people living with behaviorally acquired HIV. The Journal of adolescent health : official publication of the Society for Adolescent Medicine. 2014; 55(3):358–65. [PubMed: 24794054]
22. Stirratt MJ, Dunbar-Jacob J, Crane HM, Simoni JM, Czajkowski S, Hilliard ME, et al. Self-report measures of medication adherence behavior: recommendations on optimal use. Translational behavioral medicine. 2015; 5(4):470–82. [PubMed: 26622919]
23. Sweet D, Song J, Zhong Y, Signorovitch J. Real-world medication persistence with single versus multiple tablet regimens for HIV-1 treatment. Journal of the International AIDS Society. 2014; 17(4 Suppl 3):19537. [PubMed: 25394046]
24. Shaw S, Amico KR. Antiretroviral Therapy Adherence Enhancing Interventions for Adolescents and Young Adults 13–24 Years of Age: A Review of the Evidence Base. Journal of acquired immune deficiency syndromes (1999). 2016; 72(4):387–99. [PubMed: 26959190]
25. Margolis, DA., Gonzalez-Garcia, J., Stellbrink, H., Eron, JJ., Yazdanpanah, Y., Griffith, S., et al. Cabotegravir+Rilpivirine as Long-Acting Maintenance Therapy: LATTE-2 Week 32 Results. Conference on Retroviruses and Opportunistic Infections (CROI); Boston. 2016. Abstract 31LB

26. Groves RM. Nonresponse Rates and Nonresponse Bias in Household Surveys. Public Opinion Quarterly. 2006; 70(5):646–74.

27. Buchacz K, Frazier EL, Hall HI, Hart R, Huang P, Franklin D, et al. A Matter of Perspective: Comparison of the Characteristics of Persons with HIV Infection in the United States from the HIV Outpatient Study, Medical Monitoring Project, and National HIV Surveillance System. The open AIDS journal. 2015; 9:123–33. [PubMed: 26793282]

28. Sullivan PS, Juhasz M, McNaghten AD, Frankel M, Bozzette S, Shapiro M. Time to first annual HIV care visit and associated factors for patients in care for HIV infection in 10 US cities. AIDS care. 2011; 23(10):1314–20. [PubMed: 21939408]

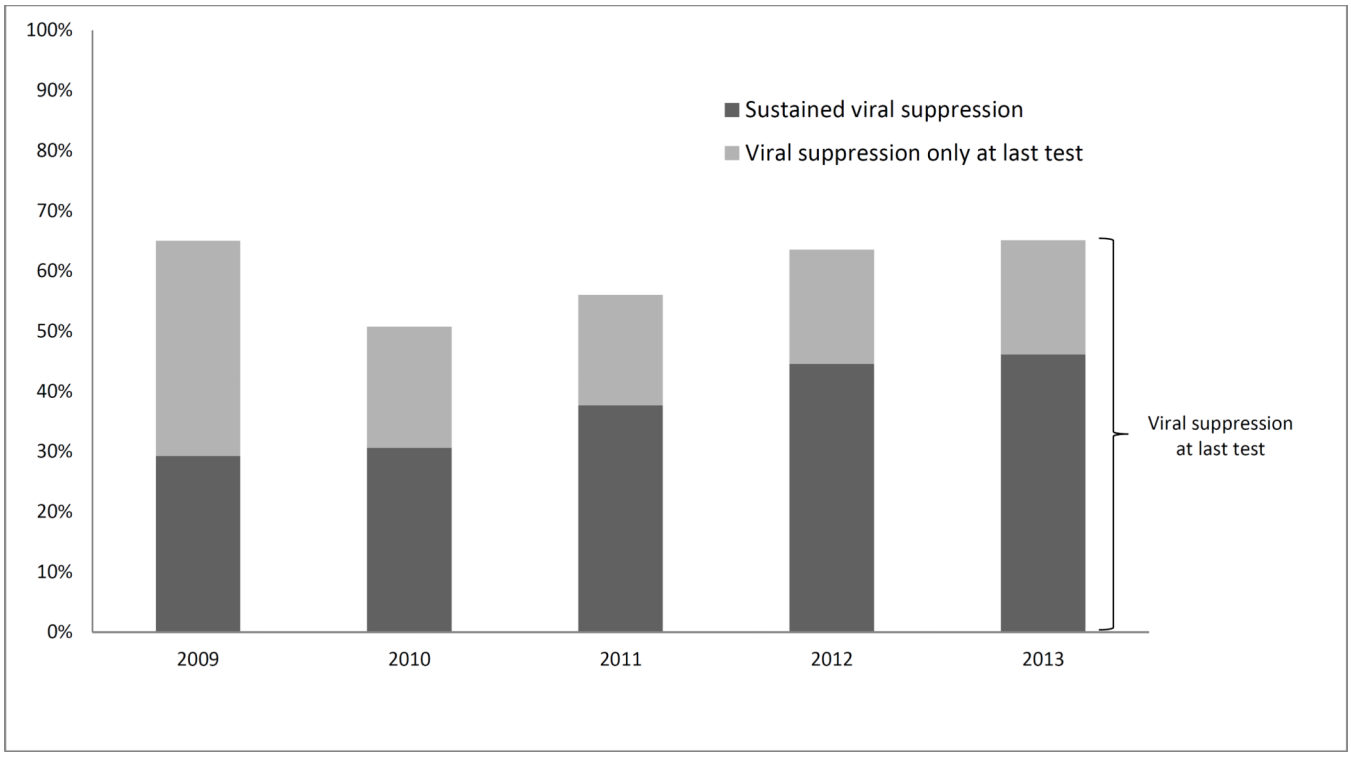

Figure 1.

Viral suppression among HIV-positive young adults receiving medical care by year --- Medical Monitoring Project, 2009–2013

Viral suppression, undetectable or <200 copies/mL.

Table 1

Selected characteristics of HIV-positive young adults in care by year – Medical Monitoring Project, United States, 2009–2013

	2009				2010				2011				2012				2013					
	n	%	95% CI		n	%	95% CI		n	%	95% CI		n	%	95% CI		n	%	95% CI		β_{TREND}	P_{TREND}
Race/ethnicity																					0.02	0.34
Not black, non-Hispanic	46	45%	31%	59%	57	44%	34%	54%	53	39%	22%	57%	56	39%	29%	50%	50	37%	23%	51%		
Black, non-Hispanic	61	55%	41%	69%	68	56%	46%	66%	74	61%	43%	78%	88	61%	50%	71%	83	63%	49%	77%		
Gender																					0.03	0.03
Not men	41	35%	25%	45%	40	35%	25%	45%	35	26%	19%	33%	33	24%	14%	32%	32	26%	19%	32%		
Men	66	65%	55%	75%	85	68%	55%	75%	92	74%	67%	81%	111	76%	67%	86%	101	74%	68%	81%		
Sexual orientation																					0.02	0.23
Not homosexual or bisexual	48	40%	30%	49%	47	41%	29%	53%	55	41%	32%	50%	54	37%	26%	48%	42	31%	21%	41%		
Homosexual or bisexual	55	60%	51%	70%	75	59%	47%	71%	71	59%	50%	68%	87	63%	52%	74%	89	69%	59%	79%		
Educational attainment																					−0.02	0.06
Not < High School	86	82%	74%	90%	102	79%	69%	88%	97	73%	65%	82%	120	86%	80%	92%	115	87%	81%	92%		
< High School	21	18%	10%	26%	23	21%	12%	31%	30	27%	18%	35%	24	14%	8%	20%	18	13%	8%	19%		
At or below poverty guideline																					−0.01	0.49
No	45	48%	37%	60%	44	34%	25%	43%	39	37%	27%	47%	44	36%	24%	48%	58	51%	40%	62%		
Yes	54	52%	40%	63%	70	66%	57%	75%	75	63%	53%	73%	83	64%	52%	76%	55	49%	38%	60%		
Health insurance/coverage																					0.00	0.88
Private or public insurance	75	66%	55%	77%	78	64%	53%	76%	82	65%	52%	78%	93	63%	52%	74%	91	68%	53%	84%		
Ryan White only or uninsured	31	34%	23%	45%	44	36%	24%	47%	43	35%	22%	48%	48	37%	26%	48%	40	32%	16%	47%		
Time since HIV diagnosis (years)																					0.02	0.48
<5	79	76%	67%	85%	91	72%	60%	85%	97	79%	70%	88%	99	75%	67%	84%	95	74%	63%	84%		
5+	27	24%	15%	33%	34	28%	15%	40%	30	21%	12%	30%	45	25%	16%	33%	38	26%	16%	37%		
HIV disease stage (medical record)																					0.00	0.89
AIDS or nadir CD4+ 0–199	47	41%	32%	51%	45	37%	27%	47%	57	47%	37%	57%	55	35%	27%	43%	56	43%	36%	50%		

	2009				2010				2011				2012				2013					
	n	%	95% CI		n	%	95% CI		n	%	95% CI		n	%	95% CI		n	%	95% CI		β_{TREND}	P_{TREND}
No AIDS and nadir CD4+ 200+	59	59%	49%	68%	80	63%	53%	73%	70	53%	43%	63%	87	65%	57%	73%	76	57%	50%	64%		

CI, confidence interval; all percentages are weighted; white and black persons were non-Hispanic, Hispanics may be of any race; all characteristics were self-reported unless otherwise noted.

Table 2

Treatment and health outcome characteristics of HIV-positive young adults receiving medical care by year --- Medical Monitoring Project, 2009–2013

	2009			2010			2011			2012			2013			2009–2013	
	n	%	(95% CI)	n	%	(95% CI)	n	%	(95% CI)	n	%	(95% CI)	n	%	(95% CI)	β_{TREND}	P_{TREND}
Prescribed ART *	84	76	(65–87)	84	66	(55–76)	103	81	(74–88)	122	82	(75–89)	115	87	(80–93)	0.04	0.01
ART adherence, past 3 days †	63	79	(68–89)	59	71	(57–83)	65	71	(61–82)	96	82	(76–88)	90	78	(71–85)	0.01	0.36
Bothered by ART side effects at least half of the time, past 30 days †	17	22	(12–32)	12	15	(8–23)	16	19	(11–27)	24	20	(13–27)	22	20	(11–29)	0.001	0.92
Taking single tablet ART regimen †	35	49	(36–63)	35	43	(31–54)	38	41	(30–52)	65	56	(46–66)	68	62	(50–73)	0.04	0.04
Regular care utilization †	79	74	(64–84)	91	73	(64–82)	95	75	(66–83)	102	70	(63–78)	93	69	(60–78)	−0.01	0.31
Viral suppression at last test *	67	65	(54–77)	64	51	(44–58)	72	56	(49–63)	93	64	(57–71)	85	65	(58–72)	0.02	0.22
Sustained viral suppression *	34	29	(20–38)	40	31	(23–38)	46	38	(30–45)	66	45	(34–55)	58	46	(37–56)	0.05	< 0.01

ART, antiretroviral therapy; CI, confidence interval; viral suppression, undetectable or <200 copies/mL; all variables measured in the past 12 months unless otherwise noted; all percentages are weighted;

* documented in medical record;

† interview self-report.